

Atty. Docket No. SPO200512-0108US
Application No: 10/761,500

Amendments to the Claims

Please cancel claims 2, 3, 13, and 19-25, amend claims 1, 7-12, and 14, and add new claims 26-33, as shown below. This listing of Claims replaces all prior versions and listings of the Claims in this application.

Listing of Claims

1. (Currently Amended) A method for cleaning a semiconductor substrate having an etched pattern of lines or trenches thereon or therein, comprising the steps of:
 - (a) cooling a cleaning solution comprising a mixture of deionized water, sulfuric acid (H₂SO₄), hydrogen peroxide (H₂O₂), and hydrofluoric acid (HF) to a predetermined temperature lower than ambient or room temperature; and
 - (b) supplying the cooled cleaning solution to the semiconductor substrate to remove etch by-products from the pattern of lines or trenches.
2. (Canceled)
3. (Canceled)
4. (Original) The method as defined by claim 1, wherein the predetermined temperature is a temperature lower than 20 °C.

Atty. Docket No. SPO200512-0108US
Application No: 10/761,500

5. (Original) The method as defined by claim 4, wherein the predetermined temperature is a temperature of between 0 °C and 20 °C.

6. (Original) The method as defined by claim 5, wherein the predetermined temperature is a temperature of between 10 °C and 20 °C.

7. (Currently Amended) The method as defined by claim 1, wherein the cleaning step comprises rotating the semiconductor substrate for a period of time between ~~several~~ 3 seconds and ~~several~~ 5 minutes, while delivering the cleaning solution to the rotating semiconductor substrate.

8. (Currently Amended) The method as defined by claim 1, wherein the etched pattern is formed from or in ~~a member selected from the group consisting of a semiconductor substrate, an insulating layer, a dielectric layer, a conducting layer, and a metal layer.~~

9. (Currently Amended) The method as defined by claim ~~[[8]]~~1, wherein the etched pattern comprises a single layer of material.

10. (Currently Amended) The method as defined by claim ~~[[8]]~~1, wherein the etched pattern comprises a multi-layer structure.

11. (Currently Amended) The method as defined by claim ~~[[8]]~~1, wherein the etched pattern comprises a conductor selected from the group consisting of aluminum, an aluminum alloy, copper, a copper alloy, a metal silicide layer, and a barrier metal layer.

Atty. Docket No. SPO200512-0108US
Application No: 10/761,500

12. (Currently Amended) A method for cleaning a semiconductor substrate having an etched metal pattern thereon, comprising the steps of:

(a) cooling an aqueous cleaning solution comprising a mixture of deionized water, sulfuric acid (H₂SO₄), hydrogen peroxide (H₂O₂), and hydrofluoric acid (HF) to a predetermined temperature lower than ambient or room temperature; and

(b) cleaning the semiconductor substrate and the etched metal pattern with the aqueous cleaning solution.

13. (Canceled)

14. (Currently Amended) The method as defined by claim ~~[[13]]~~26, wherein the predetermined temperature is a temperature of between 0 °C and 20 °C.

15. (Original) The method as defined by claim 14, wherein the predetermined temperature is a temperature of between 10 °C and 20 °C.

16. (Original) The method as defined by claim 12, wherein the etched pattern comprises a single layer of material.

17. (Original) The method as defined by claim 12, wherein the etched pattern comprises a multi-layer structure.

Atty. Docket No. SPO200512-0108US
Application No: 10/761,500

18. (Original) The method as defined by claim 12, wherein the etched metal pattern comprises a conductor selected from the group consisting of aluminum, an aluminum alloy, copper, a copper alloy, tungsten, a metal silicide layer, and a barrier metal layer.

19-25. (Canceled)

26. (New) The method as defined by claim 12, wherein the predetermined temperature is a temperature lower than 20 °C.

27. (New) The method as defined by claim 12, wherein the cleaning step comprises rotating the semiconductor substrate for a period of time between 3 seconds and 5 minutes, while delivering the cleaning solution to the rotating semiconductor substrate.

28. (New) The method as defined by claim 1, wherein the etched pattern is formed from or in a dielectric layer.

29. (New) The method as defined by claim 1, wherein the etched pattern is formed from or in an insulating layer.

30. (New) The method as defined by claim 1, wherein the etched pattern is formed from or in a conducting layer.

31. (New) The method as defined by claim 1, wherein the etched pattern is formed from or in a metal layer.

Atty. Docket No. SPO200512-0108US
Application No: 10/761,500

32. (New) The method as defined by claim 1, wherein the etched pattern comprises aluminum or an aluminum alloy.

33. (New) The method as defined by claim 12, wherein the etched metal pattern comprises aluminum or an aluminum alloy.